pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0114979**
Facility Type	**Municipal**	APS ID	**1033830**
Major / Minor	**Minor**	Authorization ID	**1345815**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Knoxville Borough, Tioga County**	Facility Name	**Knoxville Borough STP**
Applicant Address	PO Box 191	Facility Address	115 S East Street
	Knoxville, PA 16928-0191		Knoxville, PA 16928
Applicant Contact	Lyssa Smith, Treasurer	Facility Contact	Nathan Rundell, Operator
Applicant Phone	(814) 326-4126	Facility Phone	(570) 502-0845
Client ID	66901	Site ID	245551
Ch 94 Load Status	Existing Hydraulic Overload	Municipality	Knoxville Borough
Connection Status	No Exceptions Allowed	County	Tioga
Date Application Received	March 9, 2021	EPA Waived?	Yes
Date Application Accepted	March 15, 2021	If No, Reason	

Purpose of Application: Renewal of a NPDES Permit for a discharge of treated sewage

Summary of Review

The subject facility is a publicly owner treatment works (POTW) serving Knoxville Borough, Tioga County.

A map indicating the discharge location is attached.

Sludge use and disposal description and location(s): The facility's dried sludge is disposed at landfill. Per the application approximately 38 dry tons were disposed in the previous year.

Public Participation

DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested persons for a 30-day period (which may be extended for one additional 15-day period at DEP's discretion), which will be considered in making a final decision on the application. Any person may request or petition for a public hearing with respect to the application. A public hearing may be held if DEP determines that there is significant public interest in holding a hearing. If a hearing is held, notice of the hearing will be published in the *Pennsylvania Bulletin* at least 30 days prior to the hearing and in at least one newspaper of general circulation within the geographical area of the discharge.

Approve	Deny	Signatures	Date
√		Keith C. Allison Keith C. Allison / Project Manager	May 16, 2021
√		Nicholas W. Hartranft Nicholas W. Hartranft, P.E. / Environmental Engineer Manager	May 17, 2021

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.07
Latitude	41º 57' 12.61"	Longitude	-77º 25' 48.30"
Quad Name	Knoxville, PA	Quad Code	
Wastewater Description:	Sewage Effluent		
Receiving Waters	Cowanesque River (WWF)	Stream Code	30995
NHD Com ID	57350387	RMI	21.47
Drainage Area	200.2 mi^2	Yield (cfs/mi^2)	0.0132
Q_{7-10} Flow (cfs)	2.64	Q_{7-10} Basis	Gage 01518862, Cowanesque River @ Lawrenceville (1985-2008)
Elevation (ft)	1216	Slope (ft/ft)	0.00278
Watershed No.	4-A	Chapter 93 Class.	WWF
Existing Use	N/A	Existing Use Qualifier	N/A
Exceptions to Use	None	Exceptions to Criteria	None
Assessment Status	Impaired		
Cause(s) of Impairment	SILTATION		
Source(s) of Impairment	AGRICULTURE		
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake		Nelson Township Municipal Authority	
PWS Waters	Cowanesque River	Distance from Outfall (mi)	10.2

The above stream and drainage characteristics were determined for the previous review and remain adequate.

No downstream water supply is expected to be affected by the discharge at this time with the limitations and monitoring proposed.

The above-listed impairment to the Cowanesque River is attributed to siltation from Agriculture. The Knoxville discharge consistently meets its TSS (averaging 4.7 mg/L over the past two years per the application) and should not be contributing significantly to the impairment given its quality and size.

Treatment Facility Summary

Treatment Facility Name: Knoxville Borough STP

WQM Permit No.	Issuance Date	Permit Covers:
5992405	3/16/93	Treatment plant and collection system

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary	Extended Aeration	Hypochlorite	0.07

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.07	110	Existing Hydraulic Overload	Aerobic Digestion	Landfill

Changes Since Last Permit Issuance: None

Other Comments: The treatment facility, approved by WQM Permit No. 5992405, consists of influent grinder pump station, flow equalization, two aeration tanks, two secondary clarifiers, one tertiary clarifier, Ferric Chloride addition for P removal, chlorination, two chlorine contact tanks, four aerobic digesters, sludge thickener and drying beds.

Hauled in Wastes

Per the application the facility has not received any hauled in wastes over the past three years and the permittee does not anticipate receiving any over the next permit term.

Compliance History

DMR Data for Outfall 001 (from May 1, 2020 to April 30, 2021)

Parameter	APR-21	MAR-21	FEB-21	JAN-21	DEC-20	NOV-20	OCT-20	SEP-20	AUG-20	JUL-20	JUN-20	MAY-20
Flow (MGD) Average Monthly	0.0330	0.0367	0.0317	0.0384	0.0338	0.0289	0.0261	0.0246	0.0245	0.0265	0.0317	0.0620
Flow (MGD) Daily Maximum	0.0430	0.0480	0.0440	0.0514	0.0750	0.0380	0.0366	0.0369	0.0360	0.0370	0.0475	0.1204
pH (S.U.) Minimum	7.29	7.35	6.86	6.67	6.63	6.84	6.97	7.19	6.94	7.34	7.27	7.23
pH (S.U.) Maximum	7.78	7.77	7.57	7.38	7.17	7.31	7.50	7.84	7.99	7.89	7.99	7.76
DO (mg/L) Minimum	5.0	5.0	5.4	5.9	5.5	5.5	5.8	4.9	4.0	4.0	4.6	5.2
TRC (mg/L) Average Monthly	0.22	0.42	0.30	0.31	0.26	0.43	0.25	0.36	0.27	0.28	0.32	0.30
TRC (mg/L) Instantaneous Maximum	0.36	0.082	0.91	0.47	0.48	1.02	0.86	1.00	1.01	1.14	1.00	0.73
CBOD5 (lbs/day) Average Monthly	0.70	0.95	0.63	1.3	0.52	< 0.64	0.45	0.57	< 0.32	0.46	< 0.70	1.6
CBOD5 (lbs/day) Weekly Average	0.70	1.2	0.63	1.6	0.52	< 0.67	0.45	0.62	0.5	0.56	0.75	2
CBOD5 (mg/L) Average Monthly	2.4	2.8	< 2.3	3.3	2.1	< 2.2	2.2	2.1	2	2.2	< 2.2	2.5
CBOD5 (mg/L) Weekly Average	2.6	3.3	2.4	4.4	2.2	< 2.2	2.2	2.2	2.2	2.2	< 2.2	2.7
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	52	93	73	99	91	97	49	98	25	73	78	64
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	61	96	89	100	100	98	58	104	32	60	87	73
BOD5 (mg/L) Raw Sewage Influent Average Monthly	180	270	265	249	360	324	228	358	179	282	250	93
TSS (lbs/day) Average Monthly	2.0	1.4	1.1	1.6	1	< 1.2	0.82	1.1	0.9	1.3	< 1.24	3
TSS (lbs/day) Raw Sewage Influent Average Monthly	71	70	61	88	89	80	44	94	22	25	51	61

TSS (lbs/day) Raw Sewage Influent Daily Maximum	95	79	67	117	127	86	57	99	30	42	55	74
TSS (lbs/day) Weekly Average	2.2	1.4	1.1	1.7	1.05	< 1.2	0.82	1.2	0.6	1.6	< 1.35	3.1
TSS (mg/L) Average Monthly	7.0	4.0	< 4.0	< 4.0	4	< 4.0	4.0	4	< 4	7	< 4	4.5
TSS (mg/L) Raw Sewage Influent Average Monthly	235	204	221	213	345	268	205	341	152	136	164	93
TSS (mg/L) Weekly Average	7.0	4.0	4.0	< 4.0	4	< 4.0	4.0	4	< 4	10	< 4	5
Fecal Coliform (CFU/100 ml) Geometric Mean	14	49	1.4	1	2419	1	16	49	< 1	1	< 1	1
Fecal Coliform (CFU/100 ml) Instantaneous Maximum	48	120	2	1	2419	1	275	2419	< 1	1	1	1
Total Nitrogen (mg/L) Daily Maximum					41.5							
Ammonia (mg/L) Average Monthly	17.7	6.1	2.6	1.4	0.33	0.085	0.12	0.42	0.29	1.5	0.31	0.20
Total Phosphorus (lbs/day) Average Monthly	0.124	0.17	0.12	0.19	0.15	0.15	0.39	0.17	0.065	0.15	0.23	0.20
Total Phosphorus (lbs/day) Weekly Average	0.24	0.17	0.12	0.19	0.20	0.16	0.66	0.25	0.1	0.16	0.26	0.22
Total Phosphorus (mg/L) Average Monthly	0.39	0.49	0.45	0.47	0.62	0.51	1.8	0.6	0.72	0.72	0.72	0.29
Total Phosphorus (mg/L) Weekly Average	0.76	0.50	0.46	0.52	0.87	0.59	2.99	0.8	1.3	0.81	0.77	0.30

Compliance History, Cont'd

Effluent Violations for Outfall 001, from: May 1, 2020 To: April 30, 2021

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
Fecal Coliform	12/31/20	Geo Mean	2419	CFU/100 ml	2000	CFU/100 ml
Fecal Coliform	12/31/20	Geo Mean	2419	CFU/100 ml	2000	CFU/100 ml
Fecal Coliform	09/30/20	IMAX	2419	CFU/100 ml	1000	CFU/100 ml
Fecal Coliform	09/30/20	IMAX	2419	CFU/100 ml	1000	CFU/100 ml

Compliance History, Cont'd

Summary of Inspections:	The most recent inspection of the facility by the Department on February 10, 2021 identified NPDES effluent violations.
Other Comments:	A query in WMS found an open violation No. 898382 dated 10/30/20 for Knoxville Borough for Failure of a Community Water System to Develop and/or Update an Operation and Maintenance Plan. The permittee received a January 8, 2021 NOV for the late submittal of this NPDES application.

Existing Effluent Limitations and Monitoring Requirements

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Metered
pH (S.U.)	XXX	XXX	6.0	XXX	9.0 Max	XXX	1/day	Grab
DO	XXX	XXX	Report	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	15	23	XXX	25	40	50	2/month	8-Hr Composite
BOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	8-Hr Composite
TSS	18	26	XXX	30	45	60	2/month	8-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	8-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	2/month	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	2/month	Grab
Total Nitrogen	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/year	8-Hr Composite
Ammonia	XXX	XXX	XXX	Report	XXX	XXX	2/month	8-Hr Composite
Total Phosphorus	1.2	1.8	XXX	2.0	3.0	4	2/month	8-Hr Composite

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 0.07
Latitude 41º 57' 13.60" **Longitude** -77º 25' 48.00"
Wastewater Description: Sewage Effluent

Technology-Based Limitations

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Pollutant	Limit (mg/l)	SBC	Federal Regulation	State Regulation
$CBOD_5$	25	Average Monthly	133.102(a)(4)(i)	92a.47(a)(1)
	40	Average Weekly	133.102(a)(4)(ii)	92a.47(a)(2)
Total Suspended Solids	30	Average Monthly	133.102(b)(1)	92a.47(a)(1)
	45	Average Weekly	133.102(b)(2)	92a.47(a)(2)
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Fecal Coliform (5/1 – 9/30)	200 / 100 ml	Geo Mean	-	92a.47(a)(4)
Fecal Coliform (5/1 – 9/30)	1,000 / 100 ml	IMAX	-	92a.47(a)(4)
Fecal Coliform (10/1 – 4/30)	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)
Fecal Coliform (10/1 – 4/30)	10,000 / 100 ml	IMAX	-	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)

Comments: The above limits are applicable and will remain in the permit. In addition to the Fecal Coliform limits above the permit will also include quarterly e. coli bacteria monitoring due to recent changes to 25 PA Code §93 and current Department policy.

Water Quality-Based Limitations

CBOD5, NH3-N, and DO

The WQM7 model allows the Department to evaluate point source discharges of dissolved oxygen (DO), carbonaceous BOD ($CBOD_5$), and ammonia-nitrogen (NH_3-N) into free-flowing streams and rivers. To accomplish this, the model simulates two basic processes: the mixing and degradation of NH_3-N in the stream and the mixing and consumption of DO in the stream due to the degradation of $CBOD_5$ and NH_3-N. The current model includes recent updates to the NH_3-N criteria in Chapter 93. WQM7.0 modeling was performed (see Attachment B) for the discharge to Cowanesque River and indicated that the existing secondary limit for $CBOD_5$ listed above with monitoring only for NH_3-N and DO is adequate.

Total Residual Chlorine

The BAT limit of 0.5 mg/L from 25 PA Code 92a.48 is included in the existing permit. The Department uses a modeling spreadsheet to analyze the toxicity of a discharge's TRC in a receiving stream, accounting for available dilution. The attached results of the TRC spreadsheet from the previous review (see Attachment C) show that the technology-based limit of 0.5 mg/l is adequate to protect the receiving stream.

Chesapeake Bay/ Cowanesque Reservoir Nutrient Requirements

Due to the discharge to the Cowanesque Reservoir, the discharge has an existing Total Phosphorus limit of 2.0 mg/L with twice per month monitoring which will remain.

According to the Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, this facility is an existing Phase 5 Chesapeake Bay sewage discharger that is not expanding, and as such requires no nutrient loading limits but does require Total Nitrogen and Total Phosphorus monitoring. Annual total nitrogen monitoring was included in the existing permit in addition to the existing Total Phosphorus requirements.

Per a review of eDMR data, the average Total Nitrogen over the past two years was 32.75 mg/L and the average Total Phosphorus was 0.63 mg/L. Because the average total nitrogen load from the facility has been characterized no further monitoring for TN will be required at this time. However, TP monitoring must continue due to the TP effluent limitation.

Toxics Management
No further “Reasonable Potential Analysis” was performed for this minor municipal sewage facility with no industrial users to determine additional toxic parameters as candidates for limitations or monitoring.

Best Professional Judgment (BPJ) Limitations

Comments: No additional BPJ limits are necessary beyond the technology and water quality-based limits noted above.

Anti-Backsliding

No limitations have been made less stringent consistent with the anti-degradation requirements of the Clean Water Act and 40 CFR 122.44(l).

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Metered
pH (S.U.)	XXX	XXX	6.0	XXX	9.0 Max	XXX	1/day	Grab
DO	XXX	XXX	Report	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	15	23	XXX	25	40	50	2/month	8-Hr Composite
BOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	8-Hr Composite
TSS	18	26	XXX	30	45	60	2/month	8-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	8-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	2/month	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	2/month	Grab
Ammonia	XXX	XXX	XXX	Report	XXX	XXX	2/month	8-Hr Composite
Total Phosphorus	1.2	1.8	XXX	2.0	3.0	4	2/month	8-Hr Composite
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	grab

Compliance Sampling Location: Outfall 001

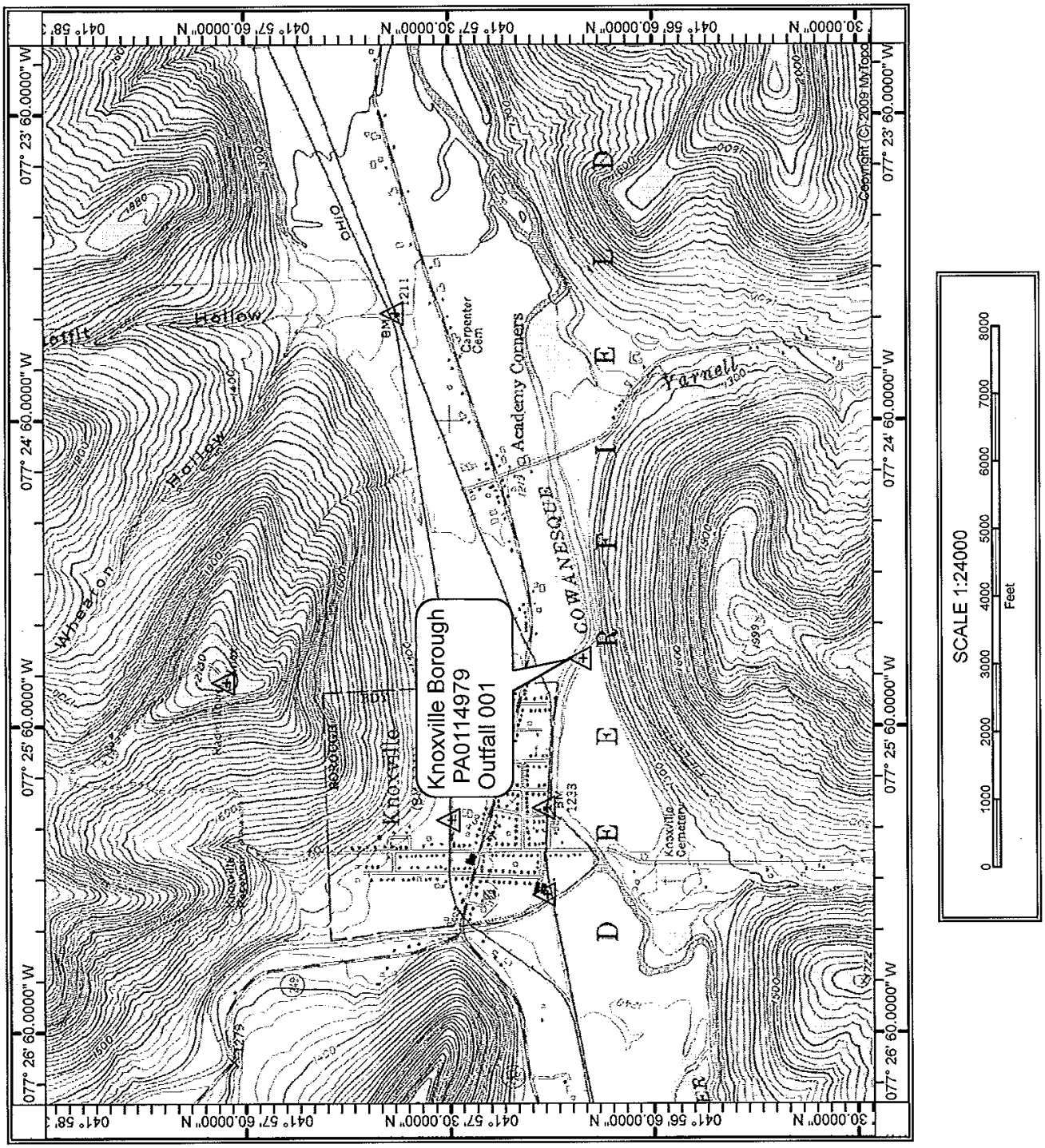
Other Comments: The above limitations and monitoring are unchanged from the existing permit except for the addition of e. coli monitoring and the removal of annual TN monitoring as mentioned above.

Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment **B**)
☐	Toxics Management Spreadsheet (see Attachment)
☒	TRC Model Spreadsheet (see Attachment **C**)
☐	Temperature Model Spreadsheet (see Attachment)
☒	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☐	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
☒	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
☐	Pennsylvania CSO Policy, 385-2000-011, 9/08.
☐	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
☒	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
☒	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
☒	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 391-2000-007, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
☒	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
☒	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
☐	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 10/97.
☐	Implementation Guidance for Application of Section 93.5(e) for Potable Water Supply Protection Total Dissolved Solids, Nitrite-Nitrate, Non-Priority Pollutant Phenolics and Fluorides, 391-2000-019, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 3/99.
☐	Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances, 391-2000-022, 3/1999.
☒	Design Stream Flows, 391-2000-023, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 391-2000-024, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
☒	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☒	SOP: Establishing Effluent Limitations for Individual Sewage Permits, rev. 8/23/13
☐	Other:

Attachments:

A. Discharge Location Map
B. WQM7.0 Model
C. TRC Model

Permit No. PA0114979



Permit No. PA0114979

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
04A	30995	COWANESQUE RIVER	**21.470**	1216.00	200.20	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.013	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Knoxville Boro	PA0114979	0.0700	0.0000	0.0000	0.000	25.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	3.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Permit No. PA0114979

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
04A	30995	COWANESQUE RIVER	20.380	1200.00	208.00	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.013	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
		0.0000	0.0000	0.0000	0.000	25.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	3.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
04A	30995	COWANESQUE RIVER

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Reach Trav Time (days)	Analysis Temp (°C)	Analysis pH
Q7-10 Flow												
21.470	2.60	0.00	2.60	.1083	0.00278	.708	35.14	49.65	0.11	0.611	20.20	7.00
Q1-10 Flow												
21.470	1.67	0.00	1.67	.1083	0.00278	NA	NA	NA	0.09	0.775	20.31	7.00
Q30-10 Flow												
21.470	3.54	0.00	3.54	.1083	0.00278	NA	NA	NA	0.13	0.517	20.15	7.00

X

Permit No. PA0114979

WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.64	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.36	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	5		

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
04A	30995	COWANESQUE RIVER

NH3-N Acute Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
21.470	Knoxville Boro	16.34	50	16.34	50	0	0

NH3-N Chronic Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
21.470	Knoxville Boro	1.87	25	1.87	25	0	0

Dissolved Oxygen Allocations

RMI	Discharge Name	CBOD5		NH3-N		Dissolved Oxygen		Critical Reach	Percent Reduction
		Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)		
21.47	Knoxville Boro	25	25	25	25	3	3	0	0

Permit No. PA0114979

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
04A	30995	COWANESQUE RIVER

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
21.470	0.070	20.200	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
35.136	0.708	49.646	0.109
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.92	0.375	1.00	0.711
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
8.034	2.893	Tsivoglou	5
Reach Travel Time (days)			
0.611			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.061	2.85	0.96	7.94
0.122	2.79	0.92	7.87
0.183	2.72	0.88	7.83
0.244	2.66	0.84	7.79
0.306	2.60	0.80	7.78
0.367	2.54	0.77	7.77
0.428	2.48	0.74	7.77
0.489	2.43	0.71	7.78
0.550	2.37	0.68	7.80
0.611	2.32	0.65	7.82

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
04A	30995	COWANESQUE RIVER

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
21.470	Knoxville Boro	PA0114979	0.070	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			3

Permit No. PA0114979

TRC EVALUATION					
Client			Date		
2.64	= Q stream (cfs)		0.5	= CV Daily	
0.07	= Q discharge (MGD)		0.5	= CV Hourly	
30	= no. samples		0.333	= AFC_Partial Mix Factor	
0.3	= Chlorine Demand of Stream		1	= CFC_Partial Mix Factor	
0	= Chlorine Demand of Discharge		15	= AFC_Criteria Compliance Time (min)	
0.5	= BAT/BPJ Value		720	= CFC_Criteria Compliance Time (min)	
	= % Factor of Safety (FOS)		0	=Decay Coefficient (K)	
Source	Reference	AFC Calculations		Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc =	2.609	1.3.2.iii	WLA cfc = 7.593
PENTOXSD TRG	5.1a	LTAMULT afc =	0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc=	0.972	5.1d	LTA_cfc = 4.414
		WQBEL_afc=	1.197		WQBEL_cfc= 5.433
Source		Effluent Limit Calculations			
PENTOXSD TRG	5.1f	AML MULT = 1.231			
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500		BAT/BPJ	
		INST MAX LIMIT (mg/l) = 1.635			

WLA afc	**(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...** **...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	**(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...** **...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))
AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)
INST MAX LIMIT	**1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)**